

**Amendments to the Specification**

Please add the following paragraph before the first paragraph beginning at page 1, line 1:

**CROSS REFERENCE TO RELATED APPLICATIONS**

This application claims the benefit of U.S. provisional application serial no. 60/512,453 filed October 17, 2003, and provisional application serial no. 60/530,488 filed December 18, 2003, which are both incorporated herein by reference.

Please substitute the following paragraph for paragraph 1 on page 1 of the specification:

The present invention relates to the diagnostic imaging systems and methods. It finds particular application in conjunction with the model based image segmentation of diagnostic medical images and will be described with particular reference thereto. Although described by the way of example with reference to CTx-ray computer tomography, it will further be appreciated that the invention is equally applicable to other diagnostic imaging techniques which generate 3D image representations.

Please substitute the following paragraph for paragraph 2 on page 1 of the specification:

Radiation therapy has been recently experiencing a transition from conformal methods to Intensity Modulation Radiation Therapy (~~IMRP~~)(IMRT). IMRT enables an improved dose distribution in the patient's body and makes possible precise delivery of high radiation doses directly to the tumor while maximally sparing the surrounding healthy tissue. Accurate target and "organ at risk" delineation is important in IMRT. Presently, the procedure is performed manually in 2D slices, which is cumbersome and the most time-consuming part of the radiation therapy planning process. The use of robust and reliable automatic segmentation technique ~~might~~would substantially facilitate the planning process and increase patient throughput.

Please substitute the following paragraph for paragraph 3 on page 1 of the specification:

Model based image segmentation is a process of segmenting (contouring) medical diagnostic images that is used to improve robustness of segmentation methods. Typically, a pre-determined 3D model of the region of interest or organ to be segmented in the

diagnostic image is selected. The model represents an anatomical organ such as a bladder or femur, but it may also represent a structure such as a target volume for radiotherapy. In many cases, the model can be used to aid automated image segmentation by providing knowledge of the organ shape as an initial starting point for the automated segmentation process. However, in some instances, the auto-segmentation of the image may not be possible, or it is not robust enough to fit a specific organ or a section ~~to~~of the model accurately. Particularly, application of the auto-segmentation to the image data is difficult due to insufficient soft tissue contrast in CT data, high organ variability, and image artifacts, e.g. caused by dental fillings or metal implants. It would be desirable to be able to initiate the segmentation with a model and further complete an accurate segmentation when auto-segmentation is not practical or to enhance the auto-segmentation result for specific situations after auto-segmentation has been completed.

Please substitute the following paragraph for paragraph 7 beginning on page 3 of the specification:

With continuing reference to FIGURE 1 and further reference to FIGURE 2, an organ model database 50 stores predetermined models 52 of specific organs and general shapes of areas of interest that could correspond to radiotherapy treatment areas of interest, e.g., shapes approximating a tumor shape to be treated with radiation. Typically, the organ models 52 are defined as a set of polygons describing a surface. Preferably, the polygons are triangles and represented by a flexible triangular mesh 54. The basic structure is a list of vertices in (x, y, z) coordinates and a list of polygons which identify the vertices which comprise each polygon, e.g. each triangle has three vertices. Storage of basic structures and automatic segmentation of images using such triangular structures is more fully described in pending U.S. Patent Application No. 10/091,049 having Publication No. ~~2002/0182466 A1~~2002/0184470 A-1 entitled Image Segmentation by Weese, et al.

Please substitute the following paragraph for paragraph 2 on page 6 of the specification:

With continuing reference to FIGURE 1 and further reference to FIGURES 5-6, a sphere push tool 80 searches for all vertices contained within a sphere 82 of a specified radius **R** around the mouse location 84. Each vertex in the sphere 82 is moved to the surface of the sphere along the vector ~~86~~ from the mouse location 84 through the original vertex location. As the mouse moves the push tool 80 by moving location 84, the organ

model **52** is pushed either inward or outward depending on the location of the vertex with respect to the mouse location **84**. The Sphere tool **80** is controlled by a single sphere radius parameter that is preferably stored with the individual organ model. In this way, the surface is deformed analogous to pressing a spherical tool of the selected radius against a soft clay surface. But, on the computer, the tool **80** can be placed inside the model to push out or outside to push in. Of course, other surfaces of predetermined shapes such as ellipses are also contemplated. Optionally, the model surface can be re-triangulated after the surface modification to smooth the reshaped organ surface.